



IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF:

Shigeki NAKATSUKASA, Hiroyuki OHGI and Kazuyori YOSHIMI

: GROUP ART UNIT: 1752

SERIAL NO: 08/974,490

: EXAMINER: Barbara Gilmore

FILED: November 19, 1997

FOR: Resin composition and multilayered structure

DECLARATION UNDER 37 C.F.R. § 1.132

RECEIVED
OCT 29 2003
TC 1700

Honorable Commissioner of Patents and Trademarks,

Washington, D.C. 20231

Sir:

I, Kazuyori Yoshimi, residing at 1621, Sakazu, Kurashiki-city, Okayama Prefecture, Japan do hereby declare as follows:

I have graduated Okayama University, Department of Science, Master Course in March, 1970; and from April, 1970 up to date I have been an employee of KURARAY CO., LTD. and have been mainly engaged in the field of development of ethylene-vinyl alcohol copolymer (hereinafter referred to as EVOH). I am familiar with the instant technical field. And I am a third inventor of the present application.

I declare that the results of experiment I have conducted are as follows and that they are true to the best of my knowledge and belief.

In order to show flexural fatigue resistance and impact resistance of the resin composition comprising EVOH and high density polyethylene (HDPE), experiment has been carried out under my supervision as follows.

Experiment 1

A dry blend was prepared from the following two components.

(A) High density polyethylene, "HI-ZEX 8200B" from Mitsui Chemicals, Inc.
(10 parts by weight)

Density = 0.956 g/cm³

MFR = 0.03 g/10 min (190°C, 2,160 g load)

Ultimate Tensile (ASTM D-638) = 40 MPa

(B) EVOH (90 parts by weight)

Ethylene content = 32 mol%

Degree of hydrolysis = 99.6%

MFR = 3.1 g/10 min (210°C, 2,160 g load)

Content of phosphorus compound (potassium dihydrogenphosphate) = 100 ppm (in terms of phosphorus element)

Content of potassium = 125 ppm (in terms of potassium element)

Content of sodium salt (sodium acetate) = 65 ppm (in terms of sodium element)

The dry blend was pelletized by extrusion through an extruder (40 mm in diameter, L/D = 24, compression ratio = 3.8) having a Madock-type mixing zone. Thus there was obtained the resin composition.

A 5-layered film specified below was produced by co-extrusion from the resin composition and the following two components fed into separate extruders.

Layer construction:

LLDPE/AD/RC/AD/LLDPE = 50/5/20/5/50 μm

Total thickness = 130 μm

- LLDPE: Ethylene- α -olefin copolymer produced by using a conventional Ziegler catalyst ("UF420" from Mitsubishi Chemical Corporation)

density = 0.925 g/cm³

MFR = 0.8 g/10 min (210°C, 2,160 g load)

- AD: Linear low-density polyethylene graft-modified with maleic anhydride for the adhesive resin layer ("Admer NF500" from Mitsui Chemicals, Inc.)

MFR = 3.6 g/10 min (210°C, 2,160 g load)

- RC: Resin composition

Each component was extruded under the following conditions.

- LLDPE: at 200 to 240°C through a 65-mm single-screw extruder with an L/D ratio of 22.
- AD: at 160 to 220°C through a 40-mm single-screw extruder with an L/D ratio of 26.
- Resin composition: at 200 to 240°C through a 40-mm single-screw extruder with an L/D ratio of 26.

The melt was discharged from a feed block die (600 mm wide) at 240°C.

A specimen (12 x 8 inches) was cut out of the resulting multilayered film and conditioned at 20°C and 65 %RH. The specimen was made into a cylinder, 3.5 inches in diameter. The cylinder was held by grips at its ends on a Gelbo Flex Tester (made by Rigaku Kogyo). Initially, the grips were 7 inches apart. The specimen was twisted by turning the grips in opposite direction through an angle of 440° such that the distance between the grips was decreased to 3.5 inches. Then the grips were moved straight and horizontally so that the distance between them

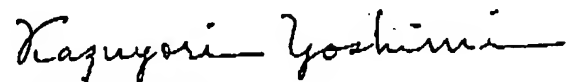
was decreased to 2.5 inches. Finally, the grips were returned to their original positions. (When the specimen was flexed to the utmost limit, the grips were 1 inch apart.) These steps were repeated at a rate of 40 cycles per minute. This test was carried out at 20°C and 65 %RH. Pinholes appeared in the specimen when the specimen was observed after 500 cycles.

A sample of flexible container was prepared by heat sealing from the multilayered film. (Two sheets of film measuring 20 by 30 cm were placed one over the other and three sides were heat-sealed, with the 20-cm side left open.) This sample was filled with water (20°C) and the open side was heat-sealed. In this way there was obtained a flexible container for bag-in-box. This container was dropped on a concrete floor. The height for the container to break (allowing water to leak) was recorded. This test was repeated for 30 samples and the results were calculated according to JIS K7211 (Section 8 for calculations) to obtain the height for 50% of the samples to break. The height for the container to break was 1.1 m.

I, the undersigned declarant, declare further that all statement made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and; further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001, of Title 18, of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signed this 26th day of December, 2001

Name:



Kazuyori Yoshimi



ENGAGE

EG 8100

Polyolefin Elastomer for General Purpose Elastomeric Applications

- General purpose elastomer
- Excellent impact properties in blends with polypropylene and polyethylene
- Excellent flow characteristics
- Excellent heat aging and compression set when crosslinked

ENGAGE* EG 8100 polyolefin elastomer is a saturated ethylene-octene copolymer that provides excellent flow properties and is efficiently crosslinked by peroxide, silane or irradiation. ENGAGE EG 8100 POE delivers exceptional heat aging, compression set, and weather resistance properties. This elastomer is also highly effective as an impact modifier in polyolefins.

PHYSICAL PROPERTIES	TEST METHOD	VALUES ¹
Density, gm/cc	ASTM D-792	.87
Mooney Viscosity, ML 1+4 @ 121°C	ASTM D-1646	23
Percent Comonomer, octene	Dow ²	24
Melt Index, dg/min	ASTM D-1238	1
Melt Flow Ratio, I ₁₀ /I ₂	ASTM D-1238	7.5
Dow Rheology Index (DRI)	Dow ²	2
Ultimate Tensile, psi (MPa)	ASTM D-638	1,500 (10.3)
100% Tensile Modulus, psi (MPa)	ASTM D-638	350 (2.4)
Ultimate Elongation, %	ASTM D-638	800
Hardness, Shore A	ASTM D-2240	75
Brittleness Temperature, °C	ASTM D-746	<-76
Flexural Modulus, 2% Secant, psi (MPa)	ASTM D-790	2,340 (16.1)

*Trademark of The Dow Chemical Company.

¹These are typical properties only, and are not to be regarded as sales specifications.
²Based on ASTM D-2238, Method B.

³A calculated value based on complex viscosity that expresses the relative influence of long chain branching on the saturability of homogeneous (single site catalyst) polyolefins.

— See "Handling Considerations" on the reverse side.

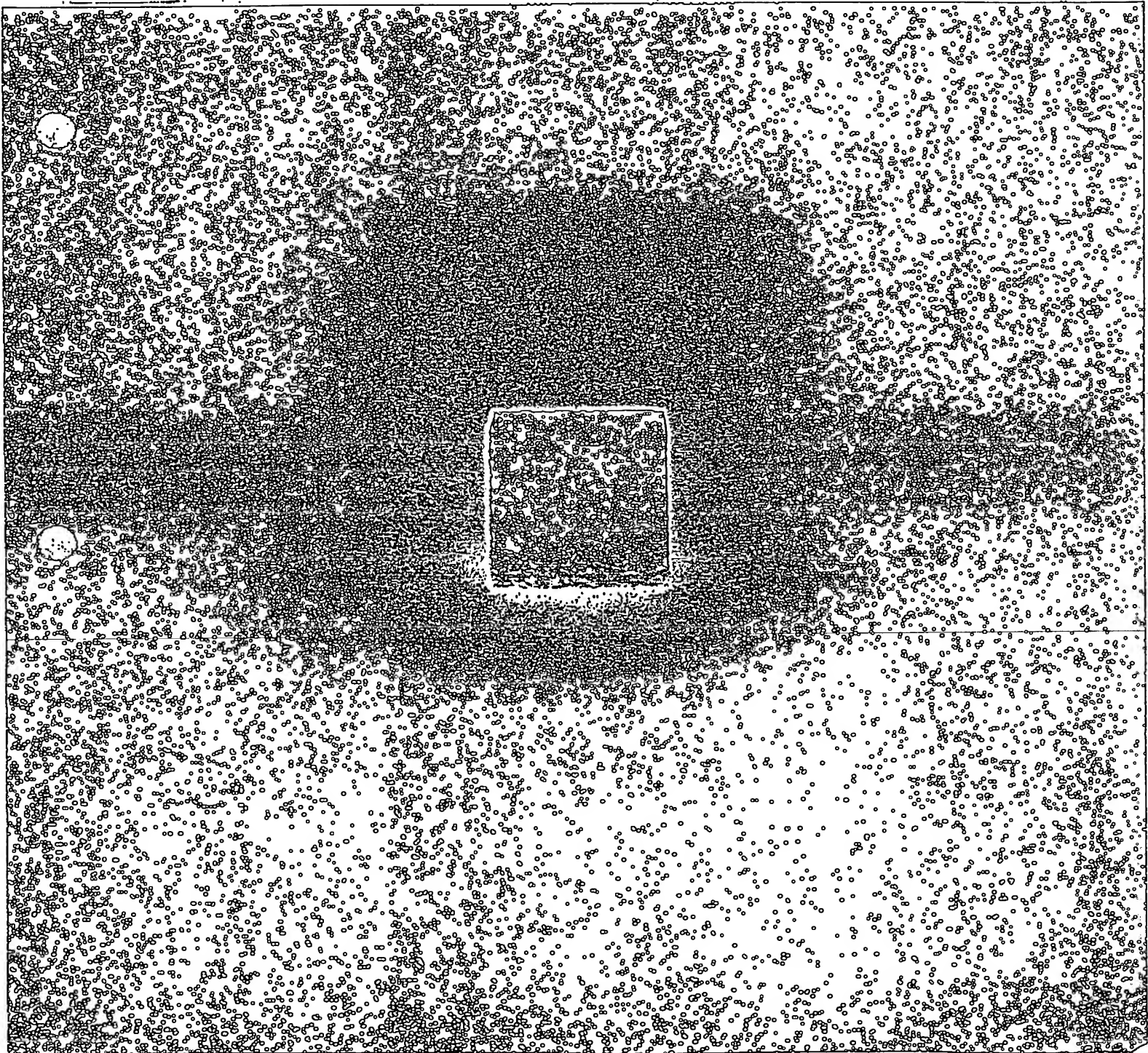


Dow Plastics

三井化学

人々の暮らしを豊かに彩る ポリエチレン

POLYETHYLENE



HIZEX
ハイゼックス

高松製作所工業株式会社

検査項目		単位	規格/基準		測定結果										判定結果										備考									
検査項目		単位	規格/基準	試験条件	1000	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000	17000	18000	19000	20000										
機械特性	引張強度	MPa	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	圧縮強度	MPa	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	引張変形率	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	圧縮変形率	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	引張弾性率	MPa	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	圧縮弾性率	MPa	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	引張伸び率	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	圧縮伸び率	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	引張弾性率	MPa	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	圧縮弾性率	MPa	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
物理特性	密度	g/cm³	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	熱膨張係数	1/°C	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	熱伝導率	W/mK	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	比熱	J/kgK	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	融点	°C	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	沸点	°C	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	粘度	Pa·s	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	表面張力	N/m	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	電導率	S/m	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	熱電率	μV/K	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
化学特性	pH値	-	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	酸価	mgKOH/g	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	塩基価	mgHCl/g	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	水分	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	灰分	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	揮発分	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	固定炭素	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	揮発炭素	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	全炭素	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	全酸素	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
電気特性	導電率	S/m	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	抵抗率	Ω·m	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	誘電率	-	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	損失角	°	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	電圧降下	V	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	電流	A	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	電力	W	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	効率	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	温度係数	1/°C	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	安定性	-	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
その他	色相	L*a*b*	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	透明度	%	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	硬度	HV	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	衝撃強度	J/m²	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	疲労強度	MPa	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	耐腐食性	h	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	耐熱性	°C	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	耐寒性	°C	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	耐候性	h	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										
	環境適合性	-	1000	1500	10	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42										

	単位換算
重　量	1g/dl=100mg/ml
血圧測定力	1kPa/dl=0.098MP
眼圧測定能力	1kg/dl=0.098MP
オシロノ図性	1kPa/dl=0.098MP
アノノテ重量測定	1kg/dl=0.0974m

Partial English translation of Catalog of "HI-REX" (Mitsui Kagaku)

物理特性表

物理項目	単位	試験方法 (ASTM)	試験条件
密度	g/cm ³	D1238	190°C
融点	°C	D505	—
引張強度	MPa	D638	—
引張伸び率	%	D638	—
引張弾性率	MPa	D638	—
引張弾性率D	%	D638	—
引張弾性率E	MPa	D747	—
引張弾性率F	J/m	D256	—
硬度		D2240	97-0
熱特性		D1693	—
熱安定性	°C	D1825	—
熱安定性	°C	D2117	—
熱安定性	°C	D746A	—

※試験方法はASTM D1238, D505, D638, D747, D256, D2240, D1693, D1825, D2117, D746Aに準拠。



Properties		unit	test method (ASTM)	test conditions
basic properties	Melt flow rate	g / 10 min.	D1238	190°C
	density	kg / m ³	D1505	—
mechanical characteristic	Stress at yield	MPa	D638	—
	Ultimate Tensile	MPa	D638	—
mechanical characteristic	Ultimate	%	D638	—
	Elongation	%	D638	—
mechanical characteristic	Olsen hardness	MPa	D747	—
	Izod impact	J / m	D256	—
mechanical characteristic	Strength		D2240	Shore D
	Hardness		D2240	Shore D
mechanical characteristic	stress crack	hour	D1693	—
	resistance	hour	D1693	—
thermal characteristic	Vicat softening	°C	D1525	—
	temperature	°C	D1525	—
thermal characteristic	melting point	°C	D2117	—
	Brittleness	°C	D2117	—
others	Temperature	°C	D746A	—
	Temperature	°C	D746A	—

characteristic

main use

VERIFICATION OF TRANSLATION

I, Takahiro Sekiguchi of c/o Kuraray Co., Ltd. 1621, Sakazu, Kurashiki-City,
Okayama-Pref., Japan

declare as follows:

1. That I am well acquainted with both the English and Japanese languages,
and
2. That the attached document is a true and correct translation made by me to
the best of my knowledge and belief of:

a part of catalog of HI-ZEX (Mitsui Chemical Corporation).

December 27, 2001
(Date)

Takahiro Sekiguchi
(Signature of Translator)